CLAIMS

We Claim:

Claim 1 -   A method for determining impulse events of a machine correlative to machine status, the steps including:

monitoring a machine with at least one transducer outputting an electrical signal correlative to machine status;

sampling said electrical signal into a digitized signal;

transforming said digitized signal into a plurality of digital packets by determining for each of said plurality of digital packets a maximum and a minimum value of said digitized signal taken over a sampling range correlated to a predefined degree of rotation of a rotating element of the machine and each of said plurality of digital packets having a location defined by the correlated predefined degree of rotation of the rotating element over which it was sampled,

comparing said values of said plurality of digital packets to known values; and

determining impulse events based on the comparison step.

Claim 2 -   The method of claim 1 further including a step of alarming off each determined impulse event as warranted for by criteria of the comparison step.

Claim 3 -   The method of claim 1 further including a step of filtering said digitized signal prior to the transforming step for defining a filtered digitized signal.

Claim 4 -   The method of claim 3 further including a step of storing said plurality of digital packets transformed from said filtered digitized signal into a digital waveform, displaying said digital waveform on a computer, and comparing said

displayed digital waveform to at least one known and displayed waveform for determining impulse events based on the comparison step.

Claim 5 - The method of claim 4 further including the step of alarming off each determined impulse event as warranted for providing machine protection.

Claim 6 - The method of claim 5 further including means for informing plant personal for each determined impulse event as warranted for providing machine protection.

Claim 7 - The method of claim 1 wherein the monitoring step includes the step of monitoring vibration of a rotating machine with at least one acceleration transducer outputting an electrical signal correlative to rotating machine status.

Claim 8 - The method of claim 7 wherein said transforming step includes transforming said digitized signal into said plurality of digital packets each having said location that is a position in rotation of a rotating element of the rotating machine for use in determining an event timing to be able to accomplish event correlation to other machine events and each having maximum and minimum values for maintaining relative magnitudes of the events so they can be compared historically to previous records.

Claim 9 - The method of claim 1 wherein the monitoring step includes the step of monitoring vibration of a reciprocating machine with at least one acceleration transducer outputting an electrical signal correlative to reciprocating machine status.

Claim 10 - The method of claim 9 wherein said transforming step includes transforming said digitized signal into said plurality of digital packets each having said location that is a location of a piston in its stroke in the reciprocating machine for

use in determining an event timing to be able to accomplish event correlation to other machine events and each having maximum and minimum values for maintaining relative magnitudes of the events so they can be compared historically to previous records.

Claim 11 - An apparatus for determining impulse events of a machine from a electrical signal outputted by a transducer monitoring the machine, said apparatus comprising in combination:

an analog to digital converter operatively coupled to the transducer for sampling and digitizing said electrical signal into a digitized electrical signal;

a processor operatively coupled to said sampling device for receiving said digitized electrical signal and including means for transforming the digitized electrical signal into a plurality of digital packets each having a maximum and a minimum value taken over a sampling range correlated to a predefined degree of rotation of a rotating element of the machine and each of said plurality of digital packets having a location defined by the correlated predefined degree of rotation of the rotating element over which it was sampled;

said processor further including means for comparing the plurality of maximum and minimum values of said plurality of digital packets and their respective locations to known values, and

means for determining impulse events based on the comparison step.

Claim 12 - The apparatus of claim 11 further including a filter operatively coupled to said analog to digital converter and to said processor for filtering said digitized signal prior to transforming the digitized electrical signal into said plurality of digital packets.

Claim 13 - The apparatus of claim 12 further including the step of storing a fraction of said plurality of digital packets transformed from said filtered digitized signal into a digital waveform for compressing said filtered digitized signal, displaying said digital waveform on a computer, and comparing said displayed digital waveform to at least one other known and displayed waveform for determining impulse events based on the comparison step.

Claim 14 - The apparatus of claim 13 further including means for alarming off each determined impulse as warranted for providing machine protection.

Claim 15 - The device of claim 14 further including means for informing plant personal for each determined impulse as warranted for providing machine protection.

Claim 16 - The device of claim 15 wherein the machine is a rotating or reciprocating machine.

Claim 17- An impulse event detection system comprising, in combination:

at least one transducer operatively coupled to an asset for measuring physical asset parameters and outputting an electrical signal correlative to asset status;

a sampling device, connected to said transducer, for sampling and digitizing said electrical signal into a digitized signal;

a first processor operatively coupled to said sampling device for receiving said digitized signal and transforming it into a plurality of digital packets each having a maximum and a minimum value taken over a sampling range having a predefined degree of movement of a moving element of the asset and each of said plurality of digital packets having a location defined by the predefined degree of movement of the moving element over which it was sampled, and

a second processor operatively coupled to said first processor and including means for comparing the plurality of maximum and minimum value data packets and their respective locations to known values and including means for determining impulse events based on the comparison step.

Claim 18 - The system of claim 17 further including means for alarming off each determined impulse event as warranted for providing asset protection.

Claim 19 - The system of claim 18 further including means for informing plant personal for each determined impulse as warranted for providing asset protection.

Claim 20 - The system of claim 19 wherein the asset is a rotating or reciprocating machine.